AMENDMENTS TO SPECIFICATION

Please replace the abstract with the following paragraph, with changes as indicated:

A storage area network that includes a monitoring component, wherein the monitoring component is capable of characterizing data flowing into or out of at least one port associated with a ~~fiber channel~~ Fibre Channel director or switch so as to enable an operator to ascertain some usable information regarding the characterized data and/or its impact on the network. In many embodiments, the monitoring component provides a visual or audible signal to the operator regarding a particular data component. The present invention is further directed to methods for monitoring a storage area network, in particular, at least one port associated therewith.

Please replace the following numbered paragraphs, with changes as indicated.

Paragraph [0009]:

Monitoring the quality of service for a SAN is critical to meeting IT availability and performance goals. It would be desirable to have real-time and trend performance data for critical service-level parameters such as availability, throughput, and utilization. Real-time performance monitoring, with flexible user-defined thresholds, allows administrators to quickly pinpoint issues that could affect overall SAN performance. Historical trending of performance data extends the administrator's capability to audit and validate service-level agreements. While most SAN fabrics provide port level statistics (e.g., MB/sec), they do not provide statistics at the device level (e.g., per server, per LUN) for a given ~~fiber channel~~ Fibre Channel port connected to a fabric. In order to get device level statistics, one method is to access the data stream through routing a mirrored copy of all data received and transmitted on any fabric port to a probe. The probe then monitors the data stream to measure service level metrics at the port and device level.

Paragraph [0015]:

FIG. 2 is a diagram showing port mirroring in the ~~fiber channel~~ <u>Fibre Channel</u> director according to the present invention for N_Ports<u>.</u>

Paragraph [0016]:

FIG. 3 is a diagram showing port mirroring in the [[~~fiber channel~~ <u>Fibre Channel</u> director according to the present invention for E.sub.13 Ports (ISLs)<u>.</u>

Paragraph [0021]:

According to a preferred embodiment, the present apparatus and methods include mirroring of both transmit and receive side of a port in a fibre channel director or switch. Mirroring, in a preferred embodiment, involves copying all ingress and egress ~~fiber channel~~ <u>Fibre Channel</u> frames and primitives for a particular port to a monitoring device (e.g., probe) directly connected to the fabric. The signal being mirrored could be ~~fiber channel~~ <u>Fibre Channel</u> (e.g., 1 GB or 2 GB), GigE (e.g., iSCSI or FCIP) or any other type of signal used by a SAN fabric. By replicating the signal using port mirroring, it is possible to keep up-to-the-minute statistics on the nature of data then associated with that particular port by viewing the information provided by the probe. The information could be displayed or stored according to any known mechanism including by graphical representations, time based reports, polling of ports, event-based triggers, and the like. The present invention provides many benefits over such prior maintenance systems such as optical splitters, ~~fiber channel~~ <u>Fibre Channel</u> patch panels or cross-connects that require cumbersome installation and wiring and associated floor space and equipment costs.

Paragraph [0026]:

1. Mirrored port preferably is capable of monitoring both the transmit and receive side of an attached N_Port, T_Port, E_Port, or any other port connected to the fabric. Two ports on a fibre channel director constitute one mirror port. Traffic received on the F-Port is mirrored to port 1 in the pair (In), traffic transmitted from the F-Port is mirrored to port 2 in the pair (Out). This is done to ensure directional consistency. <u>In one embodiment of the invention, the mechanism for copying ingress and egress data to/from a fiber channel port to</u>

the probe for analysis reflects an optical energy signal on the transmit side of the port, wherein said optical energy is transmitted to said probe; in another embodiment, approximately 10 percent of the optical energy signal on the transmit side of the port is reflected. In another embodiment, the mechanism for copying reflects an optical energy signal on the receive side of the port, wherein said optical energy is transmitted to said probe; in another embodiment, approximately 10 percent of the optical energy signal on the receive side of the port is reflected. In one embodiment of the invention, the mechanism for copying is an external Fibre Channel patch panel that replicates data for a given Fibre Channel to the probe. In an alternate embodiment, the mechanism accomplishes an internal replication of data within a switch to the probe.

Paragraph [0031]:

6. Multiple mirror ports are preferably capable of being supported on one ~~fiber channel~~ Fibre Channel director. The only limitation on mirroring may be a single mirror port per interface I/O card.

Paragraph [0036]:

9. The mirrored port can mirror both [[fiber]] fibre channel primitives (e.g., R_RDY) and frames. ~~fiber channel~~ Fibre Channel frames include error-free frames, busy frames, CRC error frames, rejected frames, and discarded frames, and so on.

Paragraph [0045]:

A probe system according to the present invention collects service-level performance data by directly monitoring the [[Fiber]] Fibre Channel, GigE or other director port 110. For example, [[Fiber]] Fibre Channel ports that could significantly impact availability and performance of the SAN include that would be assessable using port mirroring:

Paragraph [0055]:

As shown in FIG. 4, it is possible to employ port mirroring in the [[Fiber]] <u>Fibre</u> Channel director or switch to access the Fibre Channel port through software control. The probe interface is connected to two FC ports on an director or switch I/O card. One port can be mirrored per I/O card, but more could be supported. The probe system according to the present invention is generally capable of commanding the channel director to mirror any E-Port, N-Port, or GigE port for bidirectional monitoring.

Paragraph [0056]:

According to the proposed implementation of the present invention described in FIGS. 5 and 6, the SAN has no single point of failure within a Data Center. However, should the Primary Data Center experience multiple failures (e.g., redundant primary storage fails) or the entire Data Center goes off-line (e.g., disaster), then the Backup Data Center can assume partial or full operations through mirrored disks and/or redundant servers. Port mirroring enables the SAN manager to efficiently monitor any ~~fiber channel~~ <u>Fibre Channel</u> port traversing the director for service level monitoring by a probe.